



## **Amber Kinetics Inc** **Flywheel Energy Storage Demonstration**

### **Project Description**

Amber Kinetics is developing a flywheel system from sub-scale research prototype to full-scale mechanical flywheel battery and will conduct both a commercial-scale and a utility-scale demonstration. The goal is to deliver a cost-effective prototype flywheel system that can be grid connected and electrically charged and discharged. The system will have built-in sensing components that can determine frequency and voltage characteristics of the grid and can override the grid signal to manage the amount of electricity discharged. The flywheel stores energy in a spinning rotor that is connected to an electric motor that converts electrical energy into mechanical energy. To recover the energy the motor is electrically reversed and used as a generator to slow down the flywheel converting the mechanical energy back into electrical energy. Amber Kinetics will improve the traditional flywheel system by engineering breakthroughs in three areas, resulting in higher efficiency and radically reduced cost: magnetic bearings, low-cost rotor, and high-efficiency motor generator. This technology can also be used to optimize existing infrastructure.

### **Goals/Objectives**

- Deliver a prototype system that can be grid connected and electrically charged and discharged
- Develop a full-scale commercial prototype of the flywheel technology
- Provide a plan to scale the system to commercial and utility power levels
- Achieve energy storage efficiencies greater than 85 percent

### **Key Milestones**

- Engineering Prototype Flywheel Built (June 2011)
- Commercial Prototype Flywheel Built (December 2012)
- Commercial Prototype Flywheel Validation Tests Completed (March 2013)
- Commercial-Scale Flywheel Demonstration Begins (December 2013)

### **Benefits**

- Green job creation
- Electricity costs lowered
- Renewable energy integration
- U.S. energy security strengthened
- Greenhouse gas emissions reduced



### **CONTACTS**

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### **PARTNERS**

AFS Trinity

### **PROJECT DURATION**

03/01/2010–12/31/2014

### **BUDGET**

**Total Project Value**  
\$10,003,015

**DOE/Non-DOE Share**  
\$3,694,660/\$6,308,355

### **EQUIPMENT**

Filament Winding Machine  
Fiber Braiding Machine  
CNC Milling Machine  
CNC Laser Cutting Machine

### **DEMONSTRATION STATES**

California  
CID: OE0000232

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Laboratory for the Office of Electricity Delivery and  
Energy Reliability*



U.S. DEPARTMENT OF  
**ENERGY**

Office of Electricity Delivery and Energy Reliability



American Recovery and Reinvestment Act  
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Smart Grid Demonstration Program

